

US EPA ARCHIVE DOCUMENT

DATA EVALUATION RECORD

1. CHEMICAL: Trifluralin
2. TEST MATERIAL: Treflan
3. TEST TYPE: Aquatic field monitoring study and related laboratory tests.
4. STUDY IDENTIFICATION: Emmerson, J.L., P. C. Francis, D. W. Grothe, W. H. Jordan, and P. J. Cocke (1985) Trifluralin Ecological Effects Field Monitoring Study and Related Laboratory Tests. Unpublished report prepared by Lilly Research Laboratories for Eli Lilly and Co. [EPA Accession Nos. 260213 & 260214]
5. REVIEWED BY:

Les Touart
Fisheries Biologist
Ecological Effects Branch/HED

Signature:
Date:
6. APPROVED BY:

Raymond Matheny
Supervisory Biologist
Ecological Effects Branch/HED

Signature:
Date:
7. CONCLUSIONS: The study fulfills the requirement imposed under the 3(c)(2)(B) data call-in. Observations made indicate that trifluralin when used on soybeans will transport to receiving waters and is bioavailable to aquatic organisms. Trifluralin residues in catchment ponds are less than aquatic organism NOEL values reported in life-cycle tests. Trifluralin may also contribute at non-detectable residues with other environmental and/or chemical influences to increased incidences of vertebral anomalies in finfish. The significance to finfish populations of this contribution is not clear.
8. RECOMMENDATIONS: N/A

9. BACKGROUND: The test was required in a 3(c)(2)(B) notice issued at the resolution of the trifluralin special review and as a requirement of the (as yet unpublished) registration standard. The intentions were to ascertain if trifluralin residues transported to aquatic habitats, were bioavailable to aquatic fauna, and caused vertebral anomalies to finfish under typical use conditions of this product when used on soybeans.
10. DISCUSSION OF INDIVIDUAL TESTS: N/A
11. METHODS AND MATERIALS:

Study Sites: The trifluralin field study consisted of observations made at one treatment site and one reference site. The treatment site is located east of Trafalgar, Indiana and north of Indiana Highway 252. It can be found on sheet 33 of the Johnson County Soil Survey. The reference site is approximately 5.5 miles east of the treatment site and can be found on sheet 35 of the Johnson County Soil Survey.

The watershed at the treatment site covers about 16 hectares (39.5 acres) and drains into a pond of 0.9 hectares (2.1 acres). The average slope of the watershed is 4.4% with maximum slopes in the 15-20% range. The surface area of the treatment site was roughly 81% row crops, 11% brush or small trees, and 8% water. The pond has a maximum depth of 4 m with an average depth close to 2 m and a pond volume when full of roughly 15 acre-feet.

The watershed at the reference site covers about 25.3 hectares (63 acres) and drains into a pond of about 1.4 hectares (3.5 acres). The average slope of the watershed is 2.7% with maximum slopes in the 10-15% range. The surface area of the reference site was roughly 66% row crops, 4% grass or pasture, 6% brush or small trees, 19% small grains, and 5% water. The pond has a maximum depth of about 4 m with an average depth about 1.5 m.

Both watersheds contain only Crosby and Miami soil types. The USLE 'K' is 0.37 for Crosby and 0.32 for Miami.

Treatment regime: Fields at the treated site received applications of Treflan/Lexone on June 8-9, 1983, on June 6 and 9, 1984, and on May 10, 1985. At the reference site, Lasso/Lexone was applied to the fields on May 31, 1983 and on May 19 and June 3, 1984. Details of all herbicide applications are presented in Appendix G (attached).

Study Methods: Runoff monitoring from the treated and reference sites was performed by an automated monitoring system which was maintained on both sites. Parameters measured included: flow depth, switch closure, soil temperatures, ambient air temperature, solar radiation, rainfall rate, wind direction, wind speed, barometric pressure, and relative humidity.

Three pond sampling points were selected at the treatment site. These points ran along the midline of the pond and were located approximately 25, 90 and 150 m from the dam on the east end. The reference site had two sampling points, one at each end of the pond. Dissolved oxygen, pH, temperature, conductivity and light penetration were measured at each pond site throughout the study.

Pond water was collected in a solid brass Kemmerer style sampler and stored in amber glass bottles. All samples were transported on ice and stored at 4° C. Pond sediment was collected by Ekman dredge during the initial year and a Wildco stainless-steel corer in 1984 and 1985. Field soil was collected with a stainless steel Hoffer tube. Field soil was sampled in a 'W' pattern across each field. Field runoff was collected by the automatic sampler and immediately placed on ice.

Fish were captured by one of four methods: electrofishing, seining, gill netting, and trapping. Crayfish were collected in seines or minnow traps. Snails and aquatic insects were collected by hand-picking from algal mats and submerged rocks. Minnow traps also were used for collecting aquatic invertebrates.

Fish collected were either preserved in formalin or frozen. Lateral radiographs of fish were taken then the dorsal fin, head and ventral 1/3 of the body (including viscera) were removed and a dorso-ventral radiograph was taken of the remaining structures. Sections of tissue for histopathology were selected by the pathologist, based on examination of radiographs.

12. REPORTED RESULTS:

The attached tables taken from the report indicate that trifluralin was transported by runoff to adjacent waters from 0.12 to 0.30% of the total chemical applied to the watershed. Trifluralin residues in pond water remained below the 0.3 ppb detection limit throughout the investigation. In 1983, trifluralin was not detected in pond sediments. In 1984, concentrations in pond sediments were 0.001-0.004 mg/kg. In 1985, residues in sediment were greater at 0.001 to 0.017 mg/kg.

3

Trifluralin residues in finfish were below detection limit prior to the initial application of trifluralin. In 1983, the residues ranged from non-detectable to 0.009 ppm. In 1984, whole body residues were from non-detectable to 0.043 ppm. In 1985, whole body residues were up to 0.290 ppm. Vertebral abnormalities in finfish at the treated site ranged from 0.0 to 25% at the treated site and 0.0 to 10.8% at the reference site from 5-10-84 to 7-2-85.

13. STUDY AUTHOR'S CONCLUSIONS/QUALITY ASSURANCE MEASURES:

"Although trifluralin is a soil-incorporated herbicide and binds tightly to soil particles, it can be transported to a catchment pond via runoff. ... Trifluralin can accumulate to detectable levels in fish inhabiting ponds that receive runoff from fields treated with Treflan. ... At the treated site, vertebral lesion frequencies were significantly correlated to the suspended sediment concentrations in the pond but not to the trifluralin residues in the fish. In addition, there were no trends in the data that suggested that fish with vertebral lesions had higher trifluralin residues than did radiologically normal fish. ... Use of Treflan did not have an adverse effect on fish in the catchment pond."

14. REVIEWER'S DISCUSSION AND INTERPRETATION OF THE STUDY:

- A. Test Procedures: Generally consistent with the protocol guidance given. Lack of fish sampling from 12/84 to 4/85 at the reference pond could contribute to equivocal interpretation of the reported observations.
- B. Statistical Analysis: Appropriate.
- C. Discussion/Results: The study adequately demonstrates that trifluralin when used on soybeans under conditions similar to those in this investigation will transport from treatment fields in runoff to receiving waters and is bioavailable to aquatic organisms at these sites. The study does not entirely negate the presumption that trifluralin residues in natural waters could result in increased incidences of vertebral anomalies in finfish. The data suggest that trifluralin may contribute to increased vertebral anomalies, but the significance of this contribution to finfish populations is not clear. The anomalies observed were almost entirely minor lesions both at treatment and reference sites, and the effect of these anomalies on the survivability of the affected individuals is not known.

page five

D. Adequacy of Test:

1. Validation Category: Core for the requirement imposed
under the 3(c)(2)(B).

2. Rationale: n/a

3. Repairability: n/a

15. COMPLETION OF ONE-LINER FOR TEST:

16. CBI APPENDIX: N/A

Trifluralin Science Reviews

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Pages 6 through 49 are not included in this copy.

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- _____ Identity of product inert ingredients.
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